

THE EFFECTS OF MARINE GROWTH ON OFFSHORE STRUCTURES

The Structural Integrity Management of Fixed Offshore Structures recommends the need to reduce or maintain marine growth on the members primarily to reduce hydrodynamic loads on the structure. Focusing on the effect of marine growth on Offshore Wind Turbine. Jacket Structure, studies have shown that;

- 1) The increasing thickness of the marine growth would increase the member's effective diameters, leading to increased projected area and displaced volume, and hence increased dynamic loading;
- 2) With the attachment of marine growth, a member's surface is roughened. The increase in surface roughness gives rise to changes in both the drag and inertia coefficients, which strongly affects the hydrodynamic response of the structure. Large differences were found in the maximum hydrodynamic loads for different marine growth thicknesses values because not only the jacket mass was affected but also the added mass was increased.

MGP-i, A Structural Integrity Management And Life Extension Solution For Offshore Wind Farm With Jacket Design Foundation

IEV's MGP-i cleans existing marine fouling and prevents regrowth in the wave zone area of offshore structures. The MGP-i breaks down the marine colonization process by utilizing only renewable energy (ocean waves and currents). The continuous rolling action of the MGP-i against the substrate permanently prevents the settlement of micro fouling on the members.



RECOMMENDED PRACTICE BY API RP 2SIM

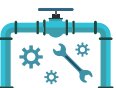
The MGP-i is recognized by API RP 2SIM - Recommended Practice for Structural Integrity Management of Fixed Offshore Structures, as a measure to reduce hydrodynamic loads.

“Such measures may include installation of sliding marine growth preventers and/or adding periodic removal to the SIM program for the platform”. (Section 13.3.4.2.3, page 53, API RP 2SIM, First Edition of November 2014 publication.)



REDUCE STATIC, DYNAMIC AND HYDRODYNAMIC LOADING

The employment of MGP-i helps in maintaining a zero growth profile of marine growth subsequently reduces the static, dynamic and hydrodynamic loading on the wind farm jacket structure, thereby increasing its structural capacity and Reserved Strength Ratio (RSR). The reduction of cyclic wave loading also improves the fatigue life of joints, hence reduces the inspection intervals and extends the life of the wind farm structure.



EASY INSTALLATION

MGP-i is typically installed from just below the sea-deck level, by scaffolders or rope access technicians. By following simple instructions, each MGP-i can be easily assembled, connected around a structural member and dropped to the sea level. Known as a Drop-N-Go solution, once deployed, the MGP-i operates instantaneously and powered by ocean waves. No further intervention or reconfiguration is necessary throughout its service life.

KEY FEATURES

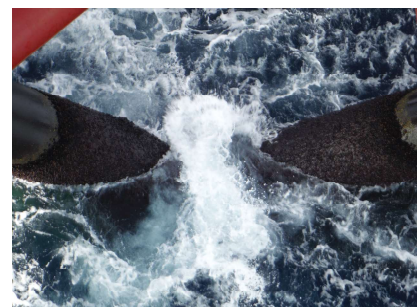
- Cleans and prevents marine growth on wave zone in a single deployment
- Powered solely by ocean energy
- Easy to install from above water
- Improves structural integrity without any structural modification
- Maintains or reduces design allowance for marine growth thickness and roughness
- Reduces static, dynamic and hydrodynamic loading
- Prolongs fatigue life and extend inspection interval
- Facilitates underwater inspection
- Certified as Typhoon proof by 3rd party
- Expected service life: minimum of 10 years
- Designed for 100-year storm
- Applicable on new and existing offshore wind farm jacket structure



Configuration of MGP-i on an Offshore Wind Farm



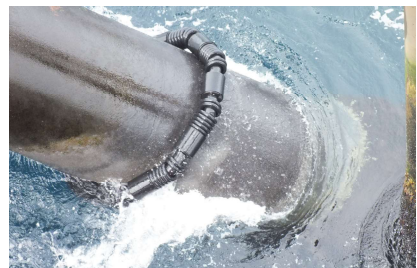
Easy to install



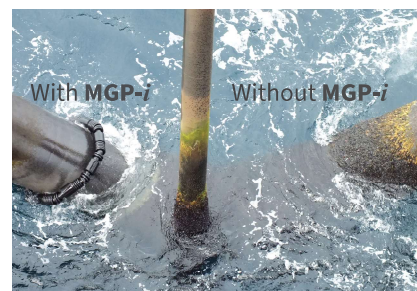
Marine growth on a structure



MGP-i cleaning in action



Structure free of marine growth



MAINTENANCE FREE AND TYPHOON PROOF

The MGP-i is maintenance free once it is being installed with its enhanced anti-impact and self-cleaning features.

The use of composite rubber discs in conjunction with “one-piece” rigid connectors provides the MGP-i with a protective layer to absorb severe impact forces during its cleaning and long-term prevention of marine growth in the wave zone. The new design prevents connectors from being exposed to direct impact against any foreign object or structural obstructions.

The product is proven to withstand the Beaufort force 12+ after undergoing a series of drop tests, validated by SGS.



PROVEN TRACK RECORD

Developed in 1987, more than 40,000 units of IEV’s Marine Growth Preventers have been installed on over 500 offshore structures since its first installation on an offshore oil platform. Today, the MGP-i technology is designed for new and existing offshore wind farm jacket structures, oil and gas platforms, jetties and terminals.



COST SAVING

Conventional methods of marine fouling cleaning by divers or ROV are costly and risky compared to the employment of MGP-i. In addition MGP-i offers a permanent marine growth prevention solution at wave zone level without the need of periodical cleaning, which saves cost associated with maintenance activities in the long run. Structural integrity improvement achieved by maintaining a zero marine growth profile is a highly cost effective method, relative to performing structural modification to achieve the same purpose. For new wind farms, structural design can possibly be designed with reduced marine growth allowance, subsequent reduced cost in material, fabrication and logistics.



GREEN TECHNOLOGY

The MGP-i is powered solely by ocean energy which forms an absolute environment friendly solution to prevent marine growth on offshore wind structures. This is achieved by harnessing the endless ocean energy, from waves, swells, currents and tidal fluctuation to power the continuous rolling motion of specially designed MGP-i.



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